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CURRENT POSITION

Chief Scientist, Geodynamics, Geophysics, and Space Geodesy Program, Raytheon ITSS, Greenbelt, MD, 1986-present. Located within the Geodynamics Branch, Goddard Space Flight Center, NASA, Greenbelt, MD

PAST POSITIONS

Visiting Professor, Institut de Physique du Globe de Paris, Laboratoire de geomagnetisme, Paris, France. Summers of 2000 and 2001.

Visiting scientist, Geological Survey of Japan, Tsukuba and Kyoto, Japan, March, 1997.

Chief Geologist, Phoenix Corp, McLean, VA, March 1984-November, 1985

Geophysicist, U.S. Geological Survey, Flagstaff, Arizona, Sept. 1976-August, 1981.

Education

Ph.D., Geology, Princeton University, Princeton, NJ, 1980-1984

M.A., Geology, Princeton University, Princeton, NJ, 1980-1982

M.S., Planetary Science, California Institute of Technology, Pasadena, CA, 1975-1976

B.S., Geophysics, California Institute of Technology, Pasadena, CA, 1971-1976

RESEARCH INTERESTS

The role of magnetic fields as fingerprints of processes in the terrestrial and Martian lithosphere and ionosphere.

PROFESSIONAL ACTIVITIES

Mission Advisory Group, SWARM mission, a constellation to study the dynamics of the Earth's magnetic field and its interaction with the Earth System, 2008. Phase A studies as an ESA Earth Explorer Opportunity Mission began in July, 2002. Mission development studies can be found at <http://www.dsri.dk/swarm> and http://www.esa.int/export/esaCP/SEM4Z967ESD_index_0.html

Co-Investigator, CHAMP satellite magnetic field mission, 2001-present.

Co-Investigator and member of the calibration team, Oersted satellite magnetic field mission to map the near-Earth magnetic field, 1999-present.

Co-Investigator and member of the calibration team, SAC-C satellite magnetic field mission, 2001-present

Co-Chair, International Association of Geomagnetism and Aeronomy, Working Group V-7, Earth and Planetary Magnetic Field satellites, 1999-2003. As part of this service, I maintain web pages at http://core2.gsfc.nasa.gov/research/mag_field/purucker/mag_missions.html devoted to 'Magnetic Field missions for Solid-Earth/Near-Earth Space Geophysics' and 'Magnetic Field missions for the terrestrial planets and moons'.

Service on a professional assessment committee for the Technical University of Denmark, Lyngby, Denmark, 2003.

Service on a Ph.D. thesis committee of University of Sydney, New South Wales, Australia. I prepared a written report on a thesis by Jon Turner entitled 'Signal processing of satellite magnetic data', May, 2003

Service on a Ph.D. thesis committee of the Institut de Physique du Globe, Paris, France. I served as the Rapporteur on a thesis by B. Langlais entitled 'Les Champs magnetiques de la Terre et de Mars: Apport des satellites Orsted et Mars Global Surveyor', Oct, 2001.

Service on a Ph.D. thesis committee of the Universite de Bretagne Occidentale, France. I served as the Rapporteur or external examiner on a thesis by N. Grammatica entitled 'Induction electromagnetique globale dans une Terre heterogene: etudes a partir de donnees d'observatoires et de donnees du satellite MAGSAT'. Sept, 2000.

Advisor for a Ph.D. student (Cathrine Fox Maule) from Copenhagen University, Dept. of Physics, 2003-present
Advisor for a Ph.D. student (Benoit Langlais) from the Institut de Physique du Globe de Paris (1999-2001)

Advisor for a M.S. student (David Lowe) at Scripps Institute of Oceanography, University of California, San Diego, 1998-2000.

Advisor for a student (David Benveniste) from the Ecole Polytechnique, Paris. Benveniste completed a thesis for his Bachelor's degree under my supervision in June, 2001 entitled 'The magnetic signature of possible dikes associated with the Pavonis Mons center, Mars'.

Advisor for a University of Maryland, Physics Dept. Senior, Joseph Covington, in 1992. The project resulted in a peer-reviewed publication 'Improvement of equivalent source inversion technique with a more symmetric dipole distribution model' (Physics of the Earth and Planetary Interiors, v. 76, 199-208, 1993).

Advisor for a National Space Club High School student, Philip Goodman, June to August 1998.
Barry Huang, June to August 2002
Christine DeLong, June to August 2003

Program Committee, American Geophysical Union, 2000-2002 Spring meetings

In charge of judging student presentations at the Spring AGU for the Geomagnetism and Paleomagnetism section. 2001. The section normally designates 1-3 student presentations as outstanding. The winners are recognized in EOS, the AGU's weekly newspaper, with a writeup and picture.

Chair or co-chair of the following special symposia:

- 1) Magnetic interpretation: Continental to Planetary Scales, 2003, Fall AGU, San Francisco
- 2) Analysis of the Oersted, CHAMP, and SAC-C magnetic field constellation, a virtual session held in conjunction with the Spring meeting of the American Geophysical Union, May 28-31, 2002. Available online at <http://www.dsri.dk/multimagsatellites> and on CD
- 3) Earth and Planetary Magnetic Survey Satellites, Spring AGU, 2001, Boston
- 4) Geophysical Data Fusion, Birmingham, United Kingdom, Int. Union of Geodesy and Geophysics, 1999
- 5) Space age geomagnetism, 1997, Spring AGU, Baltimore
- 6) Satellite geomagnetism, 1997, Int. Assoc. of Geomagnetism and Aeronomy, Uppsala, Sweden
- 7) Lithospheric magnetic fields, Boulder, Int. Union of Geodesy and Geophysics, 1995

PUBLICATIONS

Chassefiere, E., and 43 co-authors, DYNAMO: A Mars upper atmosphere package for investigating solar wind interaction and escape processes, and mapping Martian fields, Advances in Space Research, submitted.

Fox Maule, C., Purucker, M., and Olsen, N., Magnetic crustal thickness in Greenland from CHAMP and Oersted data, submitted for inclusion within the 2nd CHAMP Science volume, in press, 2004.

'Long-wavelength anomalies', 'Magsat', and 'R.A. Langel' entries in Encyclopedia of Geomagnetism and Paleomagnetism, Gubbins, D., and Herrero-Bervera, E. (eds), in review

Sabaka, T., Olsen, N., and Purucker, M., Extending Comprehensive Models of the Earth's Magnetic Field with Oersted and CHAMP data, accepted for Geophys. J. Int., 2004

Langlais, B., Purucker, M., and Manda, M., Crustal magnetic field of Mars, Jour. Geophys. Res- Planets, 109(E2), E02008, doi:10.1029/2003JE002048, 2004.

Whaler, K., and Purucker, M., Martian magnetization-preliminary models, The Leading Edge, 22(8), 763-765, August, 2003.

Vennerstrom, S., Olsen, N., Purucker, M., Acuna, M.H. and Cain, J.C., The magnetic field in the pile-up region at Mars, and its variation with the solar wind, Geophys. Res. Lett. 30(7), 1369, doi: 10.1029/2003GL016883, 2003.

Stauning, P., Luhr, H., Ulte-Guerard, P., LaBrecque, J., Purucker, M., Primdahl, F., Jorgensen, J.L., Christiansen, F., Hoeg, P. Lauritsen, K.B. (editors). OIST-4 Proceedings, 4th Oersted International Science Team Conference, 2003, DMI Scientific Report 03-09, Copenhagen, 370 pp.

Purucker, M., Sabaka, T., Olsen, N., and Maus, S., How have Oersted, CHAMP, and SAC-C improved our knowledge of the oceanic regions, OIST-4 Proceedings, 2003, 89-95.

Purucker, M. and Olsen, N., Modeling of the Earth's magnetic field and its variation with Oersted, CHAMP, and Oersted-2/SAC-C, OIST-4 Proceedings, 2003, 319-327.

Purucker, M., McCreadie, H., Vennerstrom, S., Hulot, G., Olsen, N., Luehr, H., and Garnero, E., Highlights from AGU's Virtual Session on New Magnetic Field Satellites, EOS, v. 83, no. 34, p.368, August 20, 2002 (with associated CD-ROM).

Purucker, M. and N. Olsen, Improving the definition of cratonic boundaries utilizing the lithospheric magnetic field derived from CHAMP Observations, in 'First CHAMP Mission Results for Gravity, Magnetic, and Atmospheric Studies', Reigber et al (eds), Springer, 2003, 275-280.

Ravat, D. and M. Purucker, Unraveling the magnetic mystery of the Earth's lithosphere: The background and role of the CHAMP Mission, in 'First CHAMP Mission Results for Gravity, Magnetic, and Atmospheric Studies', Reigber et al (eds), Springer, 251-260, 2003

Purucker, M., Langlais, B., Olsen, N., Hulot, G., Mandea, M., The southern edge of cratonic North America: Evidence from new satellite magnetometer observations, Geophys.Res.Lett., 29(15),8000, doi:10.1029/2001GL013645,2002
[part of a special issue on results from the Oersted satellite. Plate 3 from this paper is the cover of a special Orsted issue on August 1, 2002 (Issue #15).]

Voorhies, C.V., Sabaka, T.J., and Purucker, M., On magnetic spectra of Earth and Mars, Journal of Geophysical Research-Planets, 107(E6), 5034, doi:10.1029/2001JE001534, 2002.

Ravat, D., Whaler, K., Pilkington, M., Sabaka, T., and Purucker, M., Compatibility of high-altitude aeromagnetic and satellite altitude magnetic anomalies over Canada, Geophysics, 67, 546-554, March-April, 2002

Lowe, D.A.J., Parker, R.L., Purucker, M.E., and Constable, C.G., Estimating the crustal power spectrum from vector Magsat data, Journal of Geophysical Research, v.106, 8589-8598, May 10, 2001.

Chassefiere, E., and 68 co-authors, Scientific objectives of the DYNAMO mission, Advances in Space Research, 27, 1851-1860, 2001.

Golynsky, A., M. Chiappini, d. Damaske, F. Ferraccioli, J. Ferris, C. Finn, M. Ghidella, T. Isihara, A. Johnson, H.R. Kim, L. Kovacs, J. LaBrecque, V. Masolov, Y. Nogi, M. Purucker, P. Taylor, M. Torta, 2001, "ADMAP – Magnetic Anomaly Map of the Antarctic," 1:10 000 000 scale map, in Morris, P., and R. von Frese, eds., BAS (Misc.) 10, Cambridge, British Antarctic Survey.

Luhmann, J., Acuna, M., Purucker, M., Russell, C., and D. Lyon, The Martian magnetosheath: How Venus like?, Planetary and Space Science, 50, 489-502, 2002.

Olsen, N., Holme, R., Hulot, G., Sabaka, T., Neubert, T., Toffner-Clausen, L., Primdahl, F., Jorgensen, J., Leger, J-M., Barraclough, D., Bloxham, J., Cain, J., Constable, C., Golovkvov, V., Jackson, A., Kotze, P., Langlais, B., Macmillan, S., Mandea, M., Merayo, J., Newitt, L., Purucker, M., Risbo, T., Stampe, M., Thomson, A., and Voorhies, C., Orsted Initial Field Model, Geophysical Research Letters, v. 27, 3607-3610, Nov. 15, 2000.

- Purucker, M. and Dymant, J. Satellite magnetic anomalies related to seafloor spreading in the South Atlantic Ocean, Geophysical Research Letters, v. 27, 2765-2768, Sept. 1, 2000.
- Purucker, M., Ravat, D., Frey, H., Voorhies, C., Sabaka, T., and Acuna, M., An altitude-normalized magnetic map of Mars and its interpretation, Geophys. Res. Lett., v. 27, 2449-2452, Aug. 15, 2000.
- Purucker, M. and Clark, D. Exploration Geophysics on Mars: Lessons from magnetics, in The Leading Edge, pp. 484-487, May 2000.
- Taylor, P., and M. Purucker, Robert A. Langel III (1937-2000), EOS, v. 81, no. 15, p. 159, April 11, 2000.
- Purucker, M., Von Frese, R. and Taylor, P., Mapping and interpretation of satellite magnetic anomalies from POGO data over the Antarctic region, Annali di Geofisica, v. 42, p.215-228, April, 1999.
- Ravat, D., and M. Purucker, The future of satellite magnetic anomaly studies is bright, The Leading Edge, March, 1999, p. 326-329
- Purucker, M., R. Langel, M. Rajaram, and C. Raymond, Global magnetization models with a priori information, Journal of Geophysical Research, v.103, 2563-2584, 1998.
- Purucker, M., T. Sabaka, R. Langel, and N. Olsen, The missing dimension in Magsat and POGO anomaly studies, Geophysical Research Letters, v. 24, p.2909-2912, 1997
- Purucker, M., T. Sabaka, and R. Langel, Conjugate Gradient Analysis: A New Tool For Studying Satellite Magnetic Data Sets, Geophysical Research Letters, v. 23, p.507-510, March 1, 1996 .
- Ravat, D., R. Langel, M. Purucker, J. Arkani-Hamed, and D. Alsdorf, Global vector and scalar Magsat magnetic anomaly maps, Journal of Geophysical Research, 100, 2011-20136, 1995
- Arkani-Hamed, J., Langel, R., and M. Purucker, Scalar Magnetic Anomaly Maps of Earth derived from Pogo and Magsat Data, Journal of Geophysical Research, 99, 24075-24090, 1994.
- Langel, R., M. Purucker, and M. Rajaram, The Equatorial Electrojet and Associated Currents as Seen in Magsat Data, Jour. Atm. Terr. Physics, V.55, p.1233-1269, 1993 .
- Purucker, M., The Computation of Vector Magnetic Anomalies: A Comparison of Techniques and Errors, Physics of the Earth and Planetary Interiors, V. 62, p. 231-245, 1990.
- Purucker, M., Petrologic, paleomagnetic, and structural evidence of a Paleozoic rift system in Oklahoma, New Mexico, Colorado, and Utah, Discussion, Geol. Soc. Amer. Bull., v. 100, p.1846-1847, 1988.
- Purucker, M., Interpretation of an Aeromagnetic Survey along the Wichita Frontal Fault Zone, Oklahoma Geological Survey Guidebook 23, p. 129-136, 1986.
- Van Houten, F., and M. Purucker, Glauconitic Peloids and Chamositic Ooloids—Favorable Factors, Constraints, and Problems, Earth Science Reviews, vol. 20, p. 211 - 250, 1984
- Purucker, M., Time of Formation of Soft Iron Ore on the Gunflint and Mesabi Ranges (Ontario, Canada and Minnesota, U.S.), Economic Geology, vol. 78, p. 502-506, 1983.
- Oolitic Ironstones and Banded Iron Formation: Controls on Chemical Sedimentation, Ph.D. thesis, Princeton University, 1983.
- Purucker, M., D. Elston, and S. Bressler, Magnetic Stratigraphy of Late Cenozoic Glaciogenic Sediments, Taylor Valley, Transantarctic Mountains, AGU Antarctic Research Series, vol. 33, p.109 - 140, 1981
- Purucker, M., Elston, D., and E.M. Shoemaker, Early Acquisition of Characteristic Magnetization In Red Beds of the Moenkopi Formation (Triassic), Gray Mountain, Arizona, Journal of Geophysical Research, vol. 85, p. 997 - 1012, 1980.

Elston, D., and M. Purucker, Detrital magnetization in red beds of the Moenkopi Formation (Triassic), Gray Mountain, Arizona, Journal of Geophysical Research, vol. 84, p.1653-1665, 1979.

AWARDS

Green Prize for "Outstanding Ability and Achievement in the Field of Creative Scholarship," California Institute of Technology, 1976

REPORTS

Purucker, M., The correction of attitude jumps in the Magsat data set, Science Applications Research contract report,, Science Applications Research, 1991.

Purucker, M., Langlais, B., and Manda, M., Interpretation of a magnetic map of the Valles Marineris region, Mars, Extended abstract from the 32nd Lunar and Planetary Science Conference, March 12-16, 2001, Houston, Texas.

Olsen, N., Vennerstrom, S., Grammatica, N., and Purucker, M., The space-time structure of magnetic variations and their use for Electromagnetic Induction studies, Extended abstract from the 2nd Netlander Symposium, Nantes, France, April 2-4, 2001.